

## SHORT COMMUNICATION

### NOTES ON WEB AND WEB PLASTICITY AND DESCRIPTION OF THE MALE OF *ACHAEARANEA HIEROGLYPHICA* (MELLO-LEITÃO) (ARANEAE, THERIDIIDAE)

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**ABSTRACT.** Cobweb spiders (Theridiidae) exhibit a rich variety of web designs. Current knowledge of theridiid web architecture and evolution indicates that theridiid web design shows high within-taxon diversity and frequent convergence. Here we redescribe *Achaearanea hieroglyphica* (Mello-Leitão 1940), including the first description of the male, and document in this species (1) an unusual web design and (2) two dramatically different type of webs.

**Keywords:** Orbicularia, spider webs, taxonomy, web evolution

We made observations on *A. hieroglyphica* at the Les Nouragues Field Station, on the “Montagnes Balenfois” massif, Commune Règina, French Guiana, 4°04'08.64"N, 52°40'08.20"W, on 13–25 November 2005. The field station is placed in a 85 km<sup>2</sup> tract of undisturbed lowland blackwater rainforest at ~50 m elevation.

We documented two types of *A. hieroglyphica* webs made by the two mature females we found (Figs. 1–4). In web one (Figs. 1–3) the spider rested against the underside of a live leaf, within a simple tangle retreat. From that leaf, two non-sticky, planar sheets, situated at opposite edges of the leaf, were extended at an angle (not close to either vertical or horizontal orientation) to nearby leaves. A dense cluster of gumfoot lines—lines with sticky silk restricted to their distal tips—extended from the retreat to a leaf directly below it. In other known theridiids, planar sheets are relatively rare and very few are known that slant in this way, while gumfoot lines are common. Webs with both are known from only some *Latrodectus* species and an undescribed species close to *Chryso cambridgei* (Petrunkevitch 1911), although in these, the sheets do not slant. In web two (Fig. 4), the spider rested against the underside of a dead leaf that was suspended in the web. This web was a typical theridiid tangle web, with gumfoot lines to the substrate below, and lacked any sheets.

Our observations extend the amazing diversity,

and within-species plasticity, of web design in Theridiidae. Considering that only two webs were seen, the use of different structures to make a retreat, the presence of planar sheets in one web but not the other, and the different arrangements of the gumfoot lines demonstrate striking plasticity. Webs remain unknown for the vast majority of theridiid species, and almost all current knowledge is based on photographs of single webs (Eberhard et al. submitted). To understand the degree of within-species web plasticity, future comparative studies of theridiid webs would do well to explore both webs of multiple individuals, and multiple webs made by the same individual.

Specimens are housed in the following institutions: National Museum of Natural History, Smithsonian Institution, Washington DC (NMNH); National Museum, Rio de Janeiro (NMRJ); Muséum National d'Histoire Naturelle, Paris (MNHN). All measurements are in mm.

#### TAXONOMY

Family Theridiidae Sundevall 1833

Genus *Achaearanea* Strand 1929

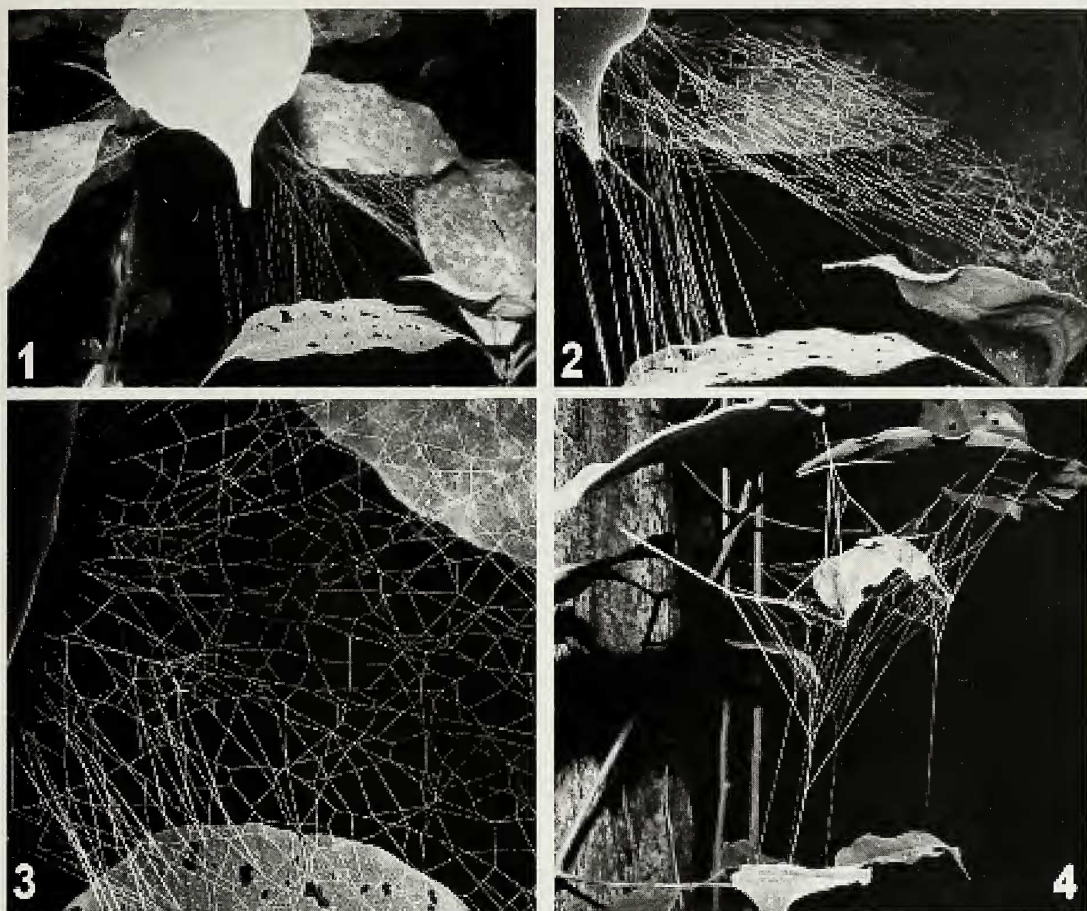
*Achaearanea hieroglyphica*

(Mello-Leitão 1940)

Figs. 1–11

*Achaearanea hieroglyphica* Mello-Leitão 1940:202.

*Chryso pentagona* Caporiacco 1954:75, figs. 12–12a.



Figures 1–4.—*Achaearanea hieroglyphica* webs. 1. Web one; the combination of a slanting planar sheet and typical gumfoot lines is very unusual among theridiids. Spider rests underneath the protruding leaf. 2. Closer view of one of the planar sheets and the gumfoot lines. 3. Details of planar sheet. 4. Web two, having only a few gumfoot lines and lacking a planar sheet, with the spider resting under a dead leaf suspended in the webbing.

*Achaearanea pentagona* (Caporiacco): Levi & Levi 1962:211; Levi 1963:202, figs. 1–3.

*Achaearanea hieroglyphica* (Mello-Leitão): Levi 1967:22.

**Type specimens.**—*Achaearanea hieroglyphica*: holotype female, BRAZIL, *Espírito Santo*, Colatina [19°32'S, 40°37'W] (NMRJ) (see Levi 1967), not examined.

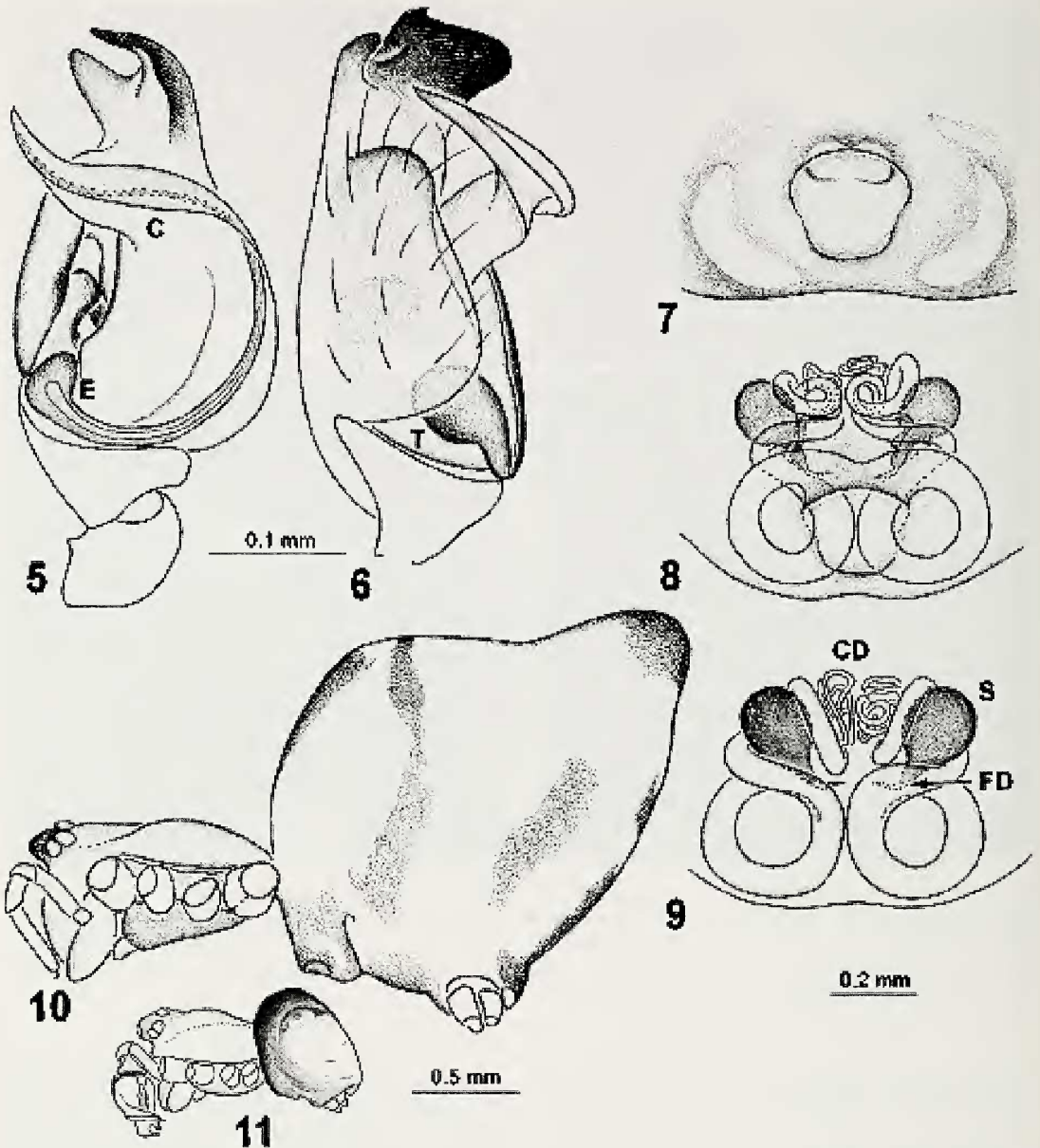
*Chryso pentagona*: holotype female, FRENCH GUIANA, Goudronville [5°01'N, 52°39'W] (MNHN) (see Levi 1967), not examined.

**Material examined.**—FRENCH GUIANA: Commune Règina, Les Nouragues Field Station, 4°04'08.64"N, 52°40'08.20"W, 13–25 November 2005, J. Coddington, N. Scharff, J. Miller, I. Agnarsson, M. Kuntner, D. DeRoche (NMNH).

**Diagnosis.**—Males of *Achaearanea hieroglyphica* differ from most *Achaearanea* species by the

strongly modified cymbium with two distal, pointed, apophyses (Figs. 5–6). It is similar to the type species *A. trapezoidalis* (Taczanowski 1873), but differs from it in having a much shorter embolus (Figs. 5–6). Females differ from most other *Achaearanea* by the extremely long and complex trajectory of the copulatory duct, and from *A. trapezoidalis* by the less regular, and asymmetric, pathways of the copulatory ducts (Fig. 9).

**Description.**—*Male*: (Les Nouragues Field Station). Total length 1.25. Prosoma 0.60 long, 0.55 wide, brown, cephalic area slightly darker. Sternum 0.40 long, 0.35 wide, reddish-brown. Abdomen 0.60 long, 0.80 wide, higher than long, proximal half dark grey, distal half white, pattern as in Fig. 11. Colulus and colular setae absent. Eyes subequal in size about 0.08 diameter. Clypeus height about 2.0 times one AME diameter. Leg I femur 0.90, patella 0.15, tibia 0.70, metatarsus 0.60, tarsus 0.25.



Figures 5-11.—*Achaearanea hieroglyphica*: 5. Male palp, ventral view. 6. Male palp, mesal view. 7. Epigynum, ventral view. 8. Epigynum, cleared in KOH, ventral view. 9. Epigynum, cleared, dorsal view. 10. Female habitus, ectal view. 11. Male habitus, ectal view. Male and female are drawn to scale; such sexual size dimorphism is not uncommon in *Achaearanea* and relatives. C = conductor, CD = copulatory ducts, E = embolus, FD = fertilization ducts, S = spermathecae, T = tegulum.

Chelicerae with a single promarginal tooth, none retrolaterally. Legs pale orange with portions of femur and tibia I darker, and narrow dark annulations at distal tip of most segments. Legs IV darker than other legs. Abdominal stridulatory picks, and epian-drous gland spigots not visible with light microscopy.

Palpal organ with large sinuous conductor, em-

bolus spiraling counter-clockwise in left palp, distal part inside groove in conductor, theridiid tegular apophysis and median apophysis apparently absent. Cymbium with diagnostic paired apophysis distally, the ectal one distinctly ridged (Figs. 5-6).

*Female*: (Les Nouragues Field Station): Total length 4.10. Prosoma 1.50 long, 1.35 wide, light brown with darker rim, and center orange. Sternum

0.90 long, 0.65 wide, dark grey. Abdomen 2.90 long, 1.85 wide, light gray with several dark and some white stripes, pattern as in Fig. 10. Colulus and colular setae absent. Eyes subequal in size about 0.10 diameter. Clypeus height about 2.7 times one AME diameter. Leg I femur 2.90, patella 0.60, tibia 2.00, metatarsus 2.20, tarsus 0.90. Legs pale yellowish with patella and distal parts of femora and tibia darker brown. Palpal claw semi-palmate (see Agnarsson 2004). Chelicera with one promarginal tooth, none retrolaterally.

Epigynum with a single central depression, apically leading to the paired copulatory openings. Copulatory ducts very long, basal section forms a near-circular loop, but the trajectory becomes increasingly irregular and asymmetric distally (Figs. 7–9).

**Variation.**—Female total length 4.10–5.00, first femur 2.90–3.55. Male total length 1.10–1.25, first femur 0.80–0.90.

**Distribution.**—French Guiana, Brazil, Peru.

**Matching sexes.**—Given that the male and female were not collected from the same webs, and they differ considerably in both size and color pattern it remains possible that they are not conspecific. However, substantial dimorphisms in sexual size and color pattern, are known in some *Achaearana* (e.g., Levi 1963). The primary evidence for matching of the sexes is their mutual resemblance to the morphologically unusual *A. trapezoidalis* (see e.g., Levi & Levi 1962), the type species of the genus. The male palpal cymbium has unusual paired distal apophyses, although similar ones are present in *A. trapezoidalis*. The epigynum resembles that of *A. trapezoidalis*, with extremely long copulatory ducts that narrow gradually along most of their length, and twist profusely.

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